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ABSTRACT

A study investigated transfer effects of training below average high school readers in the use of graphic organizers and summary writing on their recognition of compare/contrast text structure. Subjects, 32 high school students with below-expectancy standardized test scores, were placed in two groups: an experimental group (five males and 11 females); and a control group (nine males and seven females). Instruction centered on social studies expository text passages, each with comparison/contrast internal organization. Experimental group subjects received six training sessions of 40 minutes each over a three-week period, including explicit rules and modeling for constructing graphic organizers and writing summaries. Control group subjects received alternative reading instruction during this period. To assess long-term effects, a transfer task, using two social studies comparison/contrast passages drawn from the students' classroom current events reading, was conducted one month after completion of experimental group training. Passages were not adapted, but were used to determine students' ability to transfer their performance to real-world content area textual material. One passage, on nuclear power plant disasters, was designated as a moderately high prior knowledge passage based on preliminary testing which had required students to write as much as they knew about the topics. The other passage, on the death penalty, was designated as moderately low prior knowledge. Results indicated that transfer of training to real-world reading tasks occurred for both high and low prior knowledge passages. (One table of data and two figures are included, and 29 references are attached.) (MM)

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EFFECTS OF TOPIC FAMILIARITY AND TRAINING IN GENERATIVE LEARNING ACTIVITIES ON POOR READERS' COMPREHENSION OF COMPARISON/CONTRAST EXPOSITORY TEXT STRUCTURE: TRANSFER TO REAL-WORLD MATERIALS

Many researchers and theorists have advocated the use of active, strategic learning for improved comprehension (Anderson, 1980; Ausubel, Novak, & Hanesian, 1978; Rothkopf, 1981; Weinstein, 1982). Several studies have found that training in use of graphic organizers as an active learning strategy has beneficial effects on students' comprehension and summarizing (Weisberg & Balajthy, 1985, 1986, 1988; Berkowitz, 1986). Such studies have often used artificially constructed texts with consistent organizational patterns. However, real-life material encountered by students is rarely so well organized (Schallert & Tierney, 1981). Questions have been raised as to the practical transfer benefits of such training (Taylor, Olson, Prenn, Rybczynski, & Zakaluk, 1985). The compare/contrast text structure presents special challenges for less able readers (Englert & Hiebert, 1984; Raphael & Kirschner, 1985; Richgels, McGee, Lomax, & Sheard, 1987), who have difficulty summarizing even easier text structures (Head & Buss, 1987).

Previous research has indicated a relationship between prior content knowledge and knowledge of text structure in terms of their influence on comprehension. Text structure clues may be

particularly important for aiding comprehension in low prior knowledge conditions (Afflerbach, 1986). In fact, results of a study by Weisberg and Balajthy (1986) have indicated that teaching subjects to recognize the passage's text structure was more beneficial for subjects' comprehension when they knew little about the passage's topic than when their prior knowledge was moderately high.

One criterion for validating the teaching of text patterns with specifically designed passages is subject performance in real-world texts. A review of the literature on transfer of training in expository text structure suggests that, in addition to training in recognition of text structure, a critical subset of other learning strategies must also be taught for transfer to occur (Armbruster, Anderson, & Ostertag, 1986; Herber & Herber, 1987; Johnston, 1985; Piccolo, 1987; Pressley & Levin, 1983). Students should participate in more than one learning activity, such as constructing graphic organizers and writing summaries. Students should be taught some form of restatement, such as paraphrasing or summarizing, either orally or in writing. Students should receive practice and feedback on strategy use. Each of these strategies was incorporated in this study.

The purpose of this research was to investigate the transfer effects of training below average readers in high school in the use of graphic organizers and summary writing on their recognition of the compare/contrast text structure. Passages used during training had been rewritten to make the comparison/contrast organizational pattern salient. For the transfer tasks investigated in this study, the subjects' own

classroom materials were used, in which the organizational structure was not as clearly apparent as it had been in the rewritten training passages. That is, the researchers sought to determine whether these less able readers could transfer the strategies they had used successfully during training with real-world content materials regardless of their knowledge of the passage's topic. Would their posttraining graphic organizers, summaries, and answers on comprehension tests reflect recognition of the text structure and contain important passage information?

Method

Subjects

Subjects were 32 high school students who had been rostered into a reading class because their standardized test scores were below expectancy. The experimental group consisted of 5 males and 11 females. The control group consisted of 9 males and 7 females, and received alternative reading instruction during training of the experimental group. The experimental group had 8 tenth graders, 5 eleventh graders, and 3 twelfth graders. The control group had 7 tenth graders, 5 eleventh graders, and 4 twelfth graders. The mean IQ was 92.5, based on the short form of the Academic Aptitude Test.

The average age of the experimental group was 16.6 years, with a range of 15.5 to 17.8. The average age of the control group was 16.4 years, with a range of 14.8 to 19.1. The average

raw score on the comprehension subtest of the Stanford Diagnostic Reading Test was 45.7 for the experimental group, corresponding to the twenty-third percentile, with a percentile range from 1 to 67. The mean Stanford score for the control group was 47.4, corresponding to the twenty-fifth percentile, with a range from 2 to 46.

Training

Materials. Instruction centered on a collection of social studies expository text passages, each of which had a comparison-contrast internal organization. Each training passage was taken from a textbook and adapted to reflect tightly constructed organizational patterns. Mean passage length was 257 words and mean readability was sixth grade (Fry, 1977).

Procedure. Instruction was carried out by the researchers with the classroom teachers' cooperation. Experimental group subjects received 6 training sessions of forty minutes each over a three-week period. Daily feedback was provided and all student work was graded. Students were taught why recognition of specific organizational patterns in text could improve their reading comprehension and how to recognize signal words that cued comparison/contrast information. Instruction included explicit rules and modeling for constructing graphic organizers and writing summaries. Students in the experimental group were trained to follow this basic procedure:

1. Read the passage to identify topics and categories of comparisons.

2. Underline signal words to identify comparisons and contrasts.

3. Construct a graphic organizer. Organizers were created by placing the topics being compared (such as "San Francisco earthquake" and "Alaska earthquake") in boxes vertically across the top of their paper. Then the categories of comparisons (such as "amount of damage" and "duration of destruction") were listed in boxes vertically down the middle. Specific contrastive facts for each category were then written on appropriate sides of the category label.

4. Synthesize comparisons and contrasts into a summary. For this task, the original passage was removed. Students wrote their summaries using only the graphic organizers as cues, in order to avoid their copying entire sentences from the passage.

5. Study the graphic organizer and summary in preparation for a comprehension test.

Transfer Task

The transfer task was carried out one month after experimental group training had been completed in order to assess long-term effects. By prior arrangement with the classroom teachers, no instruction or practice in either graphic organizers or summarization was carried out in the interim.

Materials. Two social studies comparison-contrast passages drawn from the students' classroom current events reading were used for the transfer task. The passages were not adapted, as

had been the training passages, but were used to determine ability of students to transfer their performance to real-world content area textual material. Mean length was 692 words, much longer than the mean training passage length. Mean readability of the low prior knowledge passage was tenth grade and of the high prior knowledge passage twelfth grade (Fry, 1977).

One passage, on the topic of nuclear power plant disasters, was designated as a moderately high prior knowledge passage based on preliminary testing which had required students to write as much as they knew about the topics. The other passage, on the topic of the death penalty, was designated as moderately low prior knowledge. Passages were administered in counterbalanced order.

Procedures. The control group received brief training in the procedure immediately before the transfer task. This included a one-half hour presentation that introduced them to comparison-contrast graphic organizers and summaries, so that they could complete the transfer task.

Subjects first read the passage and underlined important contrastive information. They then constructed graphic organizers. The passages were collected and subjects wrote summaries based on their graphic organizers. All materials were then collected and the subjects completed a comprehension test that required them to identify important contrastive information. For example, one question read,

"An important way in which Chernobyl was a worse nuclear disaster than Three Mile Island was _____

_____."

Scoring and Data Analysis

Three general measures were obtained for each of the two transfer passages: (1) A graphic organizer score which assessed student understanding of the passage structure; (2) a quality of summarizing score; and (3) a comprehension test score.

A master template of the compare-contrast idea structure was obtained by parsing the text into into idea units and constructing a grid of the comparisons and contrasts within the text. The graphic organizers and the summaries were separately scored against this template of idea units. Each score was the percentage of items on the master template which had been included. Differences between raters were resolved in conference.

Data were analyzed using a three-factor split plot ANOVA with repeated measures. The one between-subjects factor was group (experimental and control). The two within-subjects factors were prior knowledge (low and high) and task (graphic organizer, summarization, and comprehension test).

Results

Results are reported in Table 1 and charted in Figures 1 and 2. A main effect was indicated for group, $F(1,30) = 21.92$, $p<.001$. The overall experimental group mean percentage score across the three transfer tasks was 50.82, and the control group

score was 29.29. A main effect was also indicated for prior knowledge, $F(1,30) = 101.42$, $p<.001$. The overall high prior knowledge mean percentage score across the three transfer tasks was 51.65 and the low prior knowledge score was 28.46. No group by prior knowledge interaction was found.

A main effect was found for task, $F(2,60) = 35.49$, $p<.001$, as was a group by prior knowledge by task interaction, $F(2,60) = 3.69$, $p<.03$. Scheffe post hoc comparisons were carried out to more clearly examine the findings. Experimental group subjects scored higher than controls on all three tasks: 24 percentage points higher on the graphic organizer task (mean across passages of 57.84 compared to 33.16), 29 percentage points higher on the summarizing task (37.91 compared to 8.69), and 10 points higher on the comprehension tests (56.72 compared to 46.00). The experimental group scored significantly higher on all measures except the comprehension test for the low prior knowledge passage.

Discussion

One primary purpose of this study was to investigate whether effects of applying graphic organizer and summarizing learning strategies to expository text would hold up when subjects moved from reading highly structured, adapted passages to reading real-world classroom content materials. The results indicated that transfer of training to real-world reading tasks did occur for both high and low prior knowledge passages. These positive

results were obtained after a delay of one month between training and the transfer task, suggesting that the learning strategies taught did maintain their effectiveness for these subjects after cessation of training.

These findings help validate past studies in which researchers have employed posttest passages that were adapted from content materials so as to highlight the text structure. The positive results from such studies are apparently transferable to real-world content materials.

The main effect for prior knowledge was expected, as readers comprehend (Afflerbach, 1986; Johnston, 1981) and summarize (Weisberg & Balajthy, 1986; Pratt, Luszcz, McKenzie-Keating, & Manning, 1982) high topic familiarity passages better than passages with low topic familiarity. Some previous research has suggested that comprehension of low prior knowledge passages is improved by training in graphic organizers while comprehension of high prior knowledge passages is not (Weisberg & Balajthy, 1986). The present study did not support that difference. There was a significant difference between the two groups for the high prior knowledge passage on every transfer task.

On the low prior knowledge task, why were subjects able to transfer their training to their graphic organizers, which reflected their recognition of text structure, and to their summaries, which contained important contrastive information, but not to the comprehension task? Training apparently enabled the experimental group to recognize text structure better than the controls. Perhaps the summaries were significantly better for the experimental group because they were written from the more

complete information in their graphic organizers. Recognition of text structure as reflected in these two tasks was improved by training, but when the topic familiarity was low, the recall of passage information was low. Less prior knowledge of the passage topic may have influenced comprehension more than subjects' ability to recognize text structure.

The limitations of the transfer to real-world materials must be noted. The training was carried out using a specific text structure, the comparison-contrast pattern, and the posttest transfer passages employed that structure. Whether training in one text structure will transfer to another structure is an issue not addressed in the present study. Also not addressed is the issue of transfer between content areas. As Tobias (1987) has noted in his survey of research on the generalizability of aptitude-treatment interaction research, there is little evidence that learning strategies automatically transfer across content areas.

In addition, the subjects in this study were all poor readers dealing with, for them, very challenging text. Further study is necessary to determine with what kinds of students and with what kinds of texts this training is effective. As McKeachie (1988) has noted, research on learning strategies has long since recognized the futility of "horse race" studies that pit one strategy against another. Instead, researchers have focused on issues of why particular strategies are effective and under what circumstances they are effective. Previous research had indicated the effectiveness of spatial learning strategies,

such as graphic organizers, for improving achievement (Holley & Dansereau, 1984). Welsberg & Balajthy (1985) had found indications that such strategies are effective by improving students' ability to recognize text structure in order to locate and remember key ideas within that structure. The present study suggests that these strategies have applicability to real classroom reading materials.

Paris, Wasik, and Van der Westhuizen (1988) have criticized much metacognitive intervention research as lacking ecological validity. The present study was planned with a concern for practical translation into classroom settings and integration within the school curriculum. The intervention was carried out in students' own classrooms and with cooperation and feedback from the classroom teachers.

The reaction of both teachers and students to the training was positive. Students appreciated the usefulness of being able to identify and summarize main ideas, hoping that this would help them improve their ability to take tests in content areas. They also found the construction of the graphic organizers to be enjoyable. Teachers were especially appreciative of learning a method that integrated writing with reading. They reported that the text structure knowledge would be easily transferable to instruction in how to organize compositions. They also continued to use the graphic organizer procedures in the students' content area reading lessons after the conclusion of the transfer posttests.

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Table 1. Mean Results by Group.

	Experimental Group		
	Graphic Organizer	Summary	Test
Low Prior Knowledge	52.00 (22.03)	30.13 (22.81)	33.50 (24.68)
High Prior Knowledge	63.69 (13.29)	45.69 (20.78)	79.94 (23.20)
	Control Group		
Low Prior Knowledge	21.75 (25.72)	1.50 (3.22)	31.88 (23.44)
High Prior Knowledge	44.56 (17.06)	15.88 (14.93)	60.13 (23.77)

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s.d. in parentheses
n=32

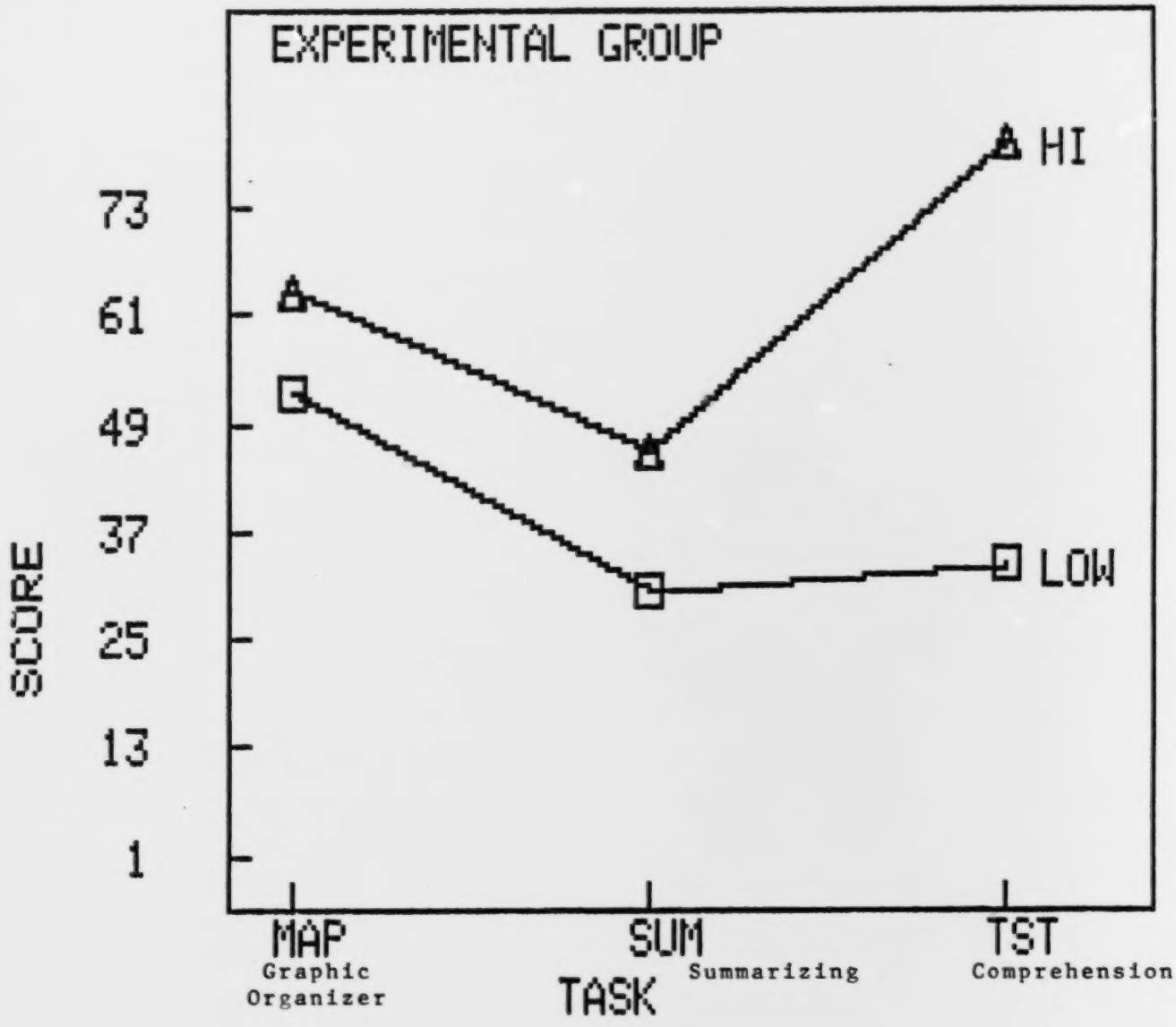

Figure 1. Results of Experimental Group.

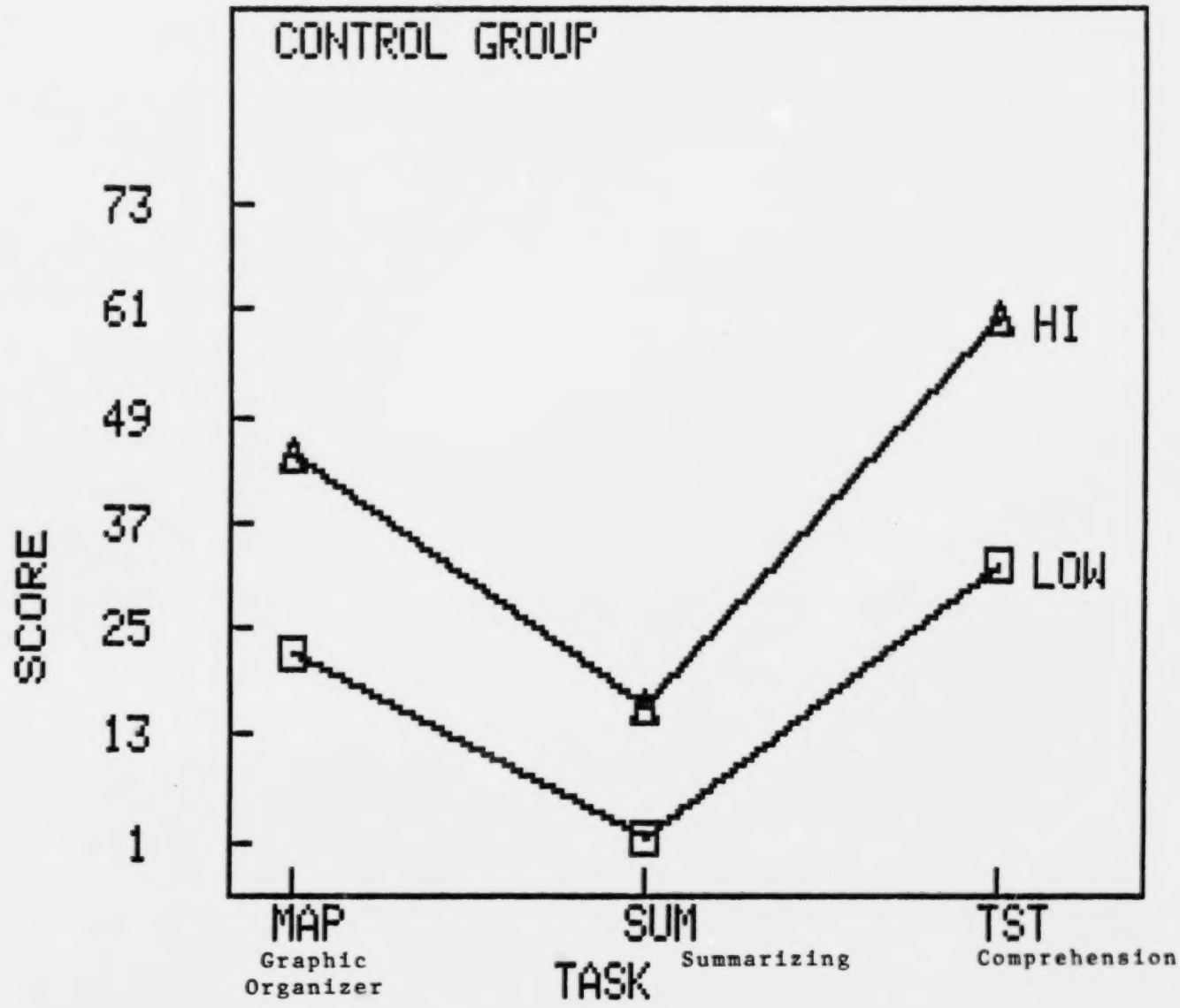

Figure 2. Results of Control Group.